CLAIMS

1.   A computer-implemented method for approximating n-band graphic equalizer settings for a media player using not more than m bands, where m is less than n, said method comprising:

(a) classifying at least a plurality of the equalizer setting values with respect to characteristics of at least a portion of a frequency response shape of at least one of a plurality of predetermined filter types; and

(b) determining parameters for one or more filters of the at least one of the plurality of predetermined filter types used in classifying the equalizer settings.

2.   A computer-implemented method as recited in claim 1,

wherein said classifying (a) operates to classify the equalizer setting values with respect to a plurality of the predetermined filter types, and

wherein said determining (b) determines the parameters for the one or more filters of the plurality of the predetermined filter types.

3.   A computer-implemented method as recited in claim 2, wherein said method further comprises:

(c) limiting the number of the one or more filters in the classification to a maximum number of filters, the maximum number being not more than m.

4.   A computer-implemented method as recited in claim 3, wherein n = 10.

5.   A computer-implemented method as recited in claim 3, wherein said limiting (c) operates to limit the plurality of the predetermined filter types in the classification to a maximum of three.

6.   A computer-implemented method as recited in claim 2, wherein said method further comprises:

       (c) assigning a priority to each of the one or more filters in the classification; and

5   (d) limiting the number of the one or more filters in the classification to a maximum number of filters based on the priority assigned to each of the plurality of the predetermined filter types in the classification, the maximum number being not more than m.

10 7.   A computer-implemented method as recited in claim 1, wherein the predetermined filter types in the classification are chosen from the group consisting of: a low-shelf, a high-shelf and a parametric.

8.   A computer-implemented method as recited in claim 7, wherein the
15 predetermined filter types in the classification include not more than one low-shelf and not more than one high-shelf.

9.   A computer-implemented method as recited in claim 1, wherein the classification approximates the equalizer setting values through use of a
20 minimum number of the predetermined filter types.

10.   A computer-implemented method as recited in claim 1, wherein the predetermined filter types are second order recursive filters.

25 11.   A computer-implemented method as recited in claim 1, wherein the filters are digital filters.

12.   A computer-implemented method as recited in claim 1, wherein the media player is a hand-held media player.

13   A computer-implemented method for approximating n-band graphic equalizer settings for a media player using less than n filters, said method comprising:

5   (a) examining the equalizer setting values for approximate correlation to at least a portion of a frequency response of a shelf type filter;

                (b) selecting the shelf type filter if a first set of the equalizer setting values approximately correlate;

                (c) examining the equalizer setting values other than the first set for
10   approximate correlation to at least a portion of a frequency response of a parametric type filter;

                (d) selecting the parametric type filter if a second set of the equalizer settings approximately correlate; and

                (e) determining parameters for the shelf type filter and the parametric
15   type filter, wherein at least the shelf type filter and the parametric type filter are used to approximate the n-band graphic equalizer settings for the media player.

14.   A computer-implemented method as recited in claim 13, wherein said
20   method approximates the n-band graphic equalizer settings for the media player using not more than m of the filters.

15.   A computer-implemented method as recited in claim 13, wherein the filters are digital filters.

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16.   A computer-implemented method as recited in claim 13, wherein the equalizer settings within the first set are adjacent one another, and wherein the equalizer settings within the second set are adjacent one another.

17.   A computer-implemented method as recited in claim 13, wherein the media player is a hand-held media player.

18.   A computer readable medium including at least computer program code for approximating n-band graphic equalizer settings for a computing device using less than n bands, said computer readable medium comprising:

computer program code for classifying at least a plurality of the equalizer setting values with respect to characteristics of at least a portion of a frequency response shape of at least one of a plurality of predetermined filter types; and

computer program code for determining parameters for one or more filters of the at least one of the plurality of predetermined filter types used in classifying the equalizer settings.

19.   A computer readable medium as recited in claim 18,

wherein said computer program code for classifying operates to classify the equalizer setting values with respect to a plurality of the predetermined filter types, and

wherein said computer program code for determining operates to determine the parameters for the one or more filters of the plurality of the predetermined filter types.

20.   A computer readable medium as recited in claim 19, wherein said computer readable medium further comprises:

computer program code for limiting the number of the one or more filters in the classification to a maximum number of filters.

21.   A computer readable medium as recited in claim 19, wherein said computer readable medium further comprises:

computer program code for assigning a priority to each of the one or more filters in the classification; and

computer program code for limiting the number of the one or more filters in the classification to a maximum number of filters based on the priority assigned to each of the plurality of the predetermined filter types in the classification, the maximum number being less than n.

22.   A computer readable medium as recited in claim 18, wherein the predetermined filter types in the classification are chosen from the group consisting of: a low-shelf, a high-shelf and a parametric.

23.   A system for approximating an n-band graphic equalizer for use on a device having limited computational resources or computational time, said system comprising:

means for classifying at least a plurality of equalizer setting values of the n-band graphic equalizer with respect to characteristics of at least a portion of a frequency response shape of at least one of a plurality of predetermined filter types; and

means for determining parameters for one or more filters of the at least one of the plurality of predetermined filter types used in classifying the equalizer settings.

24.   A system as recited in claim 23, wherein said system is an embedded system.

25.   A system as recited in claim 23, wherein the system is a portable computing device.

26.   A system as recited in claim 23, wherein the system is a hand-held media player.

5   27.   A media device, comprising:

a data store for storing media data received from a host computer, the media data including media content and equalizer setting information for at least one media item; and

a processor operatively connected to said data store, said processor
10 operates to acquire equalizer setting values based on the equalizer setting information, to approximate the equalizer setting values with a reduced filter order approximation, and to present the media content at said media player in accordance with the reduced filter order approximation.

15 28.   A media device as recited in claim 27, wherein said data store comprises a hard drive that stores the media data.

29.   A media device as recited in claim 27, wherein said media device is a hand-held media player.

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